IBM®

1401 DATA PROCESSING SYSTEM
PROGRAM CARD

OPERATION CODE	INSTRUCTION	TRANSMISSION STOPPED BY	REQUIRED WORD MARKS	CAN INST. BE CHAINED	CONTENTS OF REGISTERS AT COMP. OF OPERATION			REMARKS
					I	A	B	
1	Read A Card				NSI	Ap	081	
2	Write A Line				NSI	Ap	335	B-Add. Reg. stands at 333 with Print Storage
2□	Write Word Marks				NSI	dbb	335	B-Add. Reg. stands at 333 with Print Storage
3	Write-Read				NSI	Ap	081	Printing occurs first
4	Punch A Card				NSI	Ap	181	
4R	Read-Punch Feed				NSI	dbb	181	
5	Read-Punch				NSI	Ap	181 or 081	Normally B-Add. Reg. is at 181 unless punching is completed first
6	Write-Punch				NSI	Ap	181	
6R	Write-Read Punch Feed				NSI	dbb	181	
7	Write-Read-Punch				NSI	Ap	181 or 081	See remarks for Read-Punch
8	Start Read Feed				NSI	Ap	Bp	
9	Start Punch Feed				NSI	Ap	Bp	
A (A) (B)	Add	B-field word mark	B-field. A-field only if smaller than B-field	Yes	NSI	A-LW	B-LB	Blanks are treated as zeros, unsigned fields are treated as positive
S (A) (B)	Subtract	B-field word mark	B-field. A-field only if smaller than B-field	Yes	NSI	A-LW	B-LB	Same as remark for Add
? (A) (B)	Zero and Add	B-field word mark	B-field. A-field only if smaller than B-field	Yes	NSI	A-LW	B-LB	
! (A) (B)	Zero and Subtract	B-field word mark	B-field. A-field only if smaller than B-field	Yes	NSI	A-LW	B-LB	Can be used with a single address to change sign of field
@ (A) (B)	Multiply		A and B-field	No	NSI	A-LC	B-L of product field	Product in low-order positions of B-field
% (A) (B)	Divide		A-field	No	NSI	A-LA	Tens pos. of quot.	Quotient is developed in high-order position of B-field
B (I)	Branch			No	NSI	BI	BI	The I-address can be followed by a blank without a word mark
B (I) d	Branch if Indicator On			No	NSI	BI	dbb	
B (I) (B) d	Branch If Character Equal			Yes	NSI	BI	B-1	The character at B-address is compared to the d-character
V (I) (B) d	Branch IF WM and/or Zone			Yes	NSI	BI	B-1	Tests character at B for zone and/or WM
D (A) (B)	Move Numerical	Single digit move		Yes	NSI	A-1	B-1	Numeric bits of A moved to B. B zone bits are retained.
L (A) (B)	Load Characters to A-Word Mark	A-field word mark	A-field	Yes	NSI	A-LA	B-LA	B-field word marks are cleared
M (A) (B)	Move Characters to A- or B-Word Mark	First word mark encountered		Yes	NSI	A-LW	Bp-LW	
Y (A) (B)	Move Zone			Yes	NSI	A-1	B-1	Zone bits of A are moved to B. B numeric bits are retained.
Z (A) (B)	Move Characters and Suppress Zeros	A-field word mark		No	NSI	A-LA	B + 1	B-field word marks are cleared
, (A) (B)	Set Word Mark			Yes	NSI	A-1	B-1	Sets word marks in A- and B-address. Data is undisturbed
□ (A) (B)	Clear Word Mark			Yes	NSI	A-1	B-1	Removes the word marks at the A and B location. Data is undisturbed
C (A) (B)	Compare	First word mark encountered	A or B-field	Yes	NSI	A-LW	B-LW	If B field is longer than A field unequal compare results
E (A) (B)	Move Characters and Edit	B-field word mark	A and B-field	No	NSI	A-LA	B-LB	If zero suppression occurs B-Add. Reg. contains location of control zero + 1
F d	Control Carriage			No	NSI	dbb	dbb	

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					I	A	B	
Q (A)	Store A-Address Register			No	NSI	A-3	Ap	Stores contents of A-address register in A-address
K d	Select Stacker			No	NSI	*dbb*	*dbb*	
N	No Operation			No	NSI	Ap	Bp	Program resumes at next Op code with a WM
H (A)	Store B-Address Register			No	NSI	A-3	Bp	Stores contents of B-address register in A-address
/ (A)	Clear Storage	Stops at hundreds position of storage block involved		Yes	NSI	A	X-001	
•	Halt			No	NSI	Ap	Bp	Press start key to resume operation
# (A) (B)	Modify Address	This is a 3-position Add operation		No	NSI	A-3	B-1 or B-3	
M (% UX) (B) R	Read Tape	Inter-record gap or GM-WM in storage		No	NSI	% 4X	GM + 1	GM is inserted in storage after last character is read from tape
M (% UX) (B) W	Write Tape	GM-WM		No	NSI	% 4X	GM + 1	
L (% UX) (B) R	Read Tape with Word Marks	Inter-record gap with a GM-WM in storage		No	NSI	% 4X	GM + 1	Word separator characters are translated into WM in storage
L (% UX) (B) W	Write Tape with Word Marks	GM-WM		No	NSI	% 4X	GM + 1	WM in storage are written on tape as Word Separator Characters
M (% CX) (B) R	Read Compressed Tape	Inter-record gap		No	NSI	% 3X	B + L_{RECORD}	
P (A) (B)	Move Characters to Record Mark or GM-WM	GM-WM or record mark in A-field		Yes	NSI	A + L_A	B + L_A	WM are not moved or cleared
X (A) (B)	Move and Insert Zeros	GM-WM to left of high-order position of A-field	High-order position of expanded fields	No	NSI	A-field GM-WM	A-field GM-WM	
M (% F0) (B) R	Seek Disk		GM-WM in B + 8	No	NSI	B + 1	B + 8	Sends access arm to proper disk and track
M (% FX) (B) R	Read Disk	End of sector (1 or 5)	GM-WM mark in B + 8 and B + 209	No	NSI	B + 1	B + 210	Can READ 1 or 5 sectors depending on X-character in A-address
M (% FX) (B) W	Write Disk	End of sector (1 or 5)	GM-WM in B + 8 and B + 209	No	NSI	B + 1	B + 210	Can WRITE 1 or 5 sectors depending on X-character in A-address
L (% FX) (B) R	Read Disk with Word Marks	End of sector (1 or 5)	GM-WM in B + 8 and B + 185	No	NSI	B + 1	B + 186	176 characters and word marks are read from a sector
L (% FX) (B) W	Write Disk with Word Marks	End of sector (1 or 5)	GM-WM in B + 8 and B + 185	No	NSI	B + 1	B + 186	176 characters and word marks are written on a sector
M (% F3) (B) W	Write Disk Check	End of sector (1 or 5)	GM-WM in B + 8 and B + 209	No	NSI	B + 1	B + 210	A char. by char. comparison is made of the data in storage with the disk record
L (% F3) (B) W	Write Disk Check	End of sector (1 or 5)	GM-WM in B + 8 and B + 185	No	NSI	B + 1	B + 186	A char. by char. comparison is made of the data in storage with the disk record
M (% T0) (B) R	Read from Console Printer	GM-WM or pressing Clear key		No	NSI	% 30	B + L_B	Inquiry Request indicator must be ON
M (% T0) (B) W	Write On Console Printer	GM-WM in core storage		No	NSI	% 30	B + L_B	
L (% T0) (B) R	Read from Console Printer with WM	GM-WM or pressing Clear key		No	NSI	% 30	B + L_B	Word marks are entered by pressing WM key
L (% T0) (B) W	Write On Console Printer with WM	GM-WM in core storage		No	NSI	% 30	B + L_B	Characters with a WM are printed in red
M (% T0) (B) W	Line Space	GM-WM	GM-WM at B-Address	No	NSI	% 30	B + 1	

KEY TO ABBREVIATIONS

A	A-address of the instruction	L_D	The number of characters in a disk record
B	B-address of the instruction	L_W	The number of characters in the A- or B-field, whichever is smaller
NSI	Address of the next sequential instruction	Ap	The previous setting of the A-address register
BI	Address of the next instruction if a branch occurs	Bp	The previous setting of the B-address register
L_A	The number of characters in the A-field	*dbb*	The d-character and blank in the units and tens positions
L_B	The number of characters in the B-field	dpp	The d-character and the tens and units positions of the previous register setting
L_C	The number of characters in multiplicand field	GM-WM	Group-Mark with a Word-Mark